Banisteria, Number 27, 2006

Patera panselenus (Hubricht) on the Lower Cheat River, West Virginia (Gastropoda: Pulmonata: Polygyridae)

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ABSTRACT

The central Appalachian Mountain endemic land snail *Patera panselenus* (Hubricht, 1976) is reported for the first time from the lower Cheat River in Monongalia and Preston counties, West Virginia. Previously known from 20 counties in southern West Virginia, Virginia, and Kentucky, this new report is a northeastern range extension of more than 100 kilometers. Collected shells, dissection of genitalia, and occurrences of this animal along the lower Cheat River are detailed.

Key words: Cheat River, land snail distribution, *Patera panselenus*, Virginia bladetooth.

INTRODUCTION

The cryptic polygyrid land snail *Patera panselenus* (Hubricht, 1976) has a gray-colored body and a flattened heliciform shell, approximately 18 mm wide and 9 mm tall, with a single parietal denticle (Fig. 1). This animal was long considered part of *Patera perigrapta* (Pilsbry, 1894) until Hubricht (1976) recognized that *P. panselenus* has a more depressed shell and a shorter penis than this congener. Initially named *Mesodon panselenus*, it has been subsequently assigned to the genus *Patera* in a reorganization of the tribe Mesodontini (Emberton, 1991).

Despite its common name, Virginia bladetooth (Turgeon, et al., 1998), *P. panselenus* is more widely distributed in West Virginia. Prior to this report, *P. panselenus* was known from Boone, Cabell, Calhoun, Clay, Fayette, Greenbrier, Kanawha, Lincoln, Logan, McDowell, Mingo, Nicholas, Raleigh, Summers, Wayne, and Wyoming counties in West Virginia; Buchanan, Dickenson, and Wise counties in Virginia; and Pike County in Kentucky (Hubricht, 1985; Field Museum of Natural History 210933, 210946, 214699 unpublished specimens, collected by Emberton). Calhoun County, West Virginia was previously the northernmost limit of this species.

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STUDY AREA AND METHODS

The lower Cheat River, West Virginia, for this paper, is the approximately 40-kilometer stretch downstream from the Pringle Tract of Camp Dawson US Army National Guard base, Preston County, to Cheat Lake, Monongalia County. Camp Dawson is just downstream (north) of Rowlesburg, where the Cheat River passes through the Laurel Mountain-Briery Mountain Ridge. Elevation of this part of the river ranges from 410 m (1,350 feet) to 268 m (880 feet) above sea level at Cheat Lake. Elevations of the plateau above the river vary greatly, but downstream of Briery Mountain, which is above 850 m (2,800 feet), the higher rim elevations are approximately 640 m (2,100 feet) asl, as in the Hacklebarney Run vicinity and at Coopers Rock and Snake Hill.

This portion of the Cheat River is a transitional ecological zone, where the western side of the Appalachian Plateau descends to the Ohio Valley. The walls of the Cheat River Valley are a series of Pennsylvanian and Mississippian age sedimentary rock strata deposited 300-350 million years ago (Cardwell et al., 1968). Pottsville Sandstone occurs at higher elevations, sometimes outcropping above steep slopes, and Pottsville talus is widespread on slopes all the way to river elevation. This is underlain by the softer, often reddish, Mauch Chunk. Beginning near Kingwood and

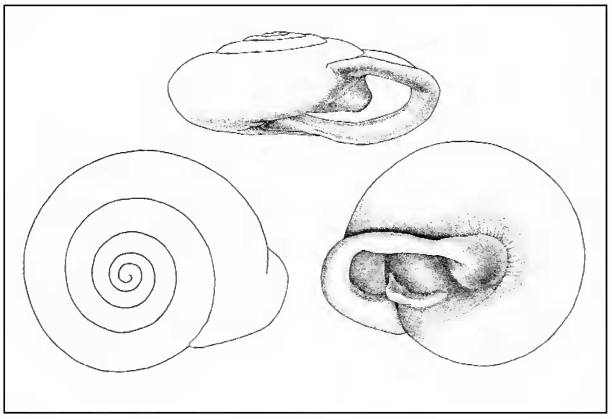

Fig. 1. Drawing of *Patera panselenus* holotype by Elizabeth Liebman (from Hubricht, 1976, with permission of Malacological Review).

continuing downstream, gray or whitish Greenbrier Limestone appears at lower elevations, in which caves and a variety of marine fossils occur. Lowest are strata of Purslane (Pocono) Sandstone.

The undulating slopes of the lower Cheat River valley are mostly forested, exhibiting a wide variety of forest stand types. *Quercus* spp. and *Acer rubrum* L. are ubiquitous. *Quercus* spp. dominate xeric upper slopes, and are found there with *Oxydendron arboreum* (L.) and sometimes extensive stands of *Kalmia latifolia* L. *Quercus prinus* L., *Betula lenta* L., and sometimes *Nyssa sylvatica* (Marsh.) are widespread on rocky sites. *Tsuga canadensis* (L.) Carr. with *Betula allegheniensis* Britton and large stands of *Rhododendron maximum* L. are often found at wet acidic ravines and shaded lower slopes.

Liriodendron tulipifera L. sometimes dominates the rich cove and rich lower slope habitats, which also hold *Quercus rubra* L., *Q. alba* L., *Carya* spp., *Fraxinus americana* L., *Acer saccharum* (Marsh.), *Fagus grandifolia* Ehrh., *Tilia americana* L., *Ulmus rubra* Muhl., and, at the lowest elevations, *Aesculus octandra* Marsh. In these habitats, *Asimina triloba* (L.) Dunal. is a common gap colonizer and *Vitis* spp., *Parthenocissus quinquefolia* (L.) Planch., and *Aristolochia macrophylla* Lam. are sometimes rampant. *Robinia pseudoacacia* L. is frequent in disturbed areas and some locations have *Ailanthus altissima* (Mill.) invasions. Along the Cheat River banks, *Platanus occidentalis* L. becomes a canopy dominant and a number of shrubs such as *Alnus* sp., *Rhododendron arborescens* (Pursh.) Torr., and *Hydrangea arborescens* L. are found. The herbaceous vegetation of the canyon is extremely varied, depending upon the site.

Land snail inventory was conducted between 1997 and 2003 on several parts of the lower Cheat River. Most of this snail inventory was incidental to work targeting the federally-threatened land snail *Triodopsis platysayoides* (Brooks, 1933) on state and former Allegheny Energy power company lands between Albright and Cheat Lake. Other surveys were at the Camp Dawson Army Training Site, and a comprehensive land snail inventory at Cornwell Cave, at that time on Allegheny Energy property managed in cooperation with the West Virginia Chapter of The Nature Conservancy.

As part of the inventory for *T. platysayoides*, snail collection was often focused upon rock outcrop and talus features, but extensive collection to and from rock features was also conducted. Inventory was not at all systematic but included attention to rock surfaces and crevices, logs and snags, and the bases of trees and plants. Two live *P. panselenus* collected were drowned for 24 h in tap water and then preserved in ethanol. Snails were identified using Pilsbry (1940), Hubricht (1976), and Emberton (1991).

RESULTS

Patera panselenus was encountered at several sites on both sides of the Cheat River in Preston County (Fig. 2), between 39° 22' 25" N latitude at the Pringle Tract of Camp Dawson Army Training Site and 39° 35' 03" N latitude above the mouth of the Big Sandy River. Twelve specimens were collected from nine sites (CMNH 64753, 68536, 68544, 68583, 68600, 68612, 70643, 70685, 70716). In addition to these new specimens, a putative *Patera appressa* (Say, 1821) shell reported by MacMillan (1949) from Monongalia County (CMNH 62.38550) was re-identified as *Patera panselenus*. Collected in 1910 at Mont Chateau by Dr. H. Kahl, its shell sculpture includes widely spaced spiral striae, as in *P. panselenus* and *P. perigrapta*. Mont Chateau is now the northern limit of this species at approximately 39° 38' 14" N, and remains the only known Monongalia County location. This site is approximately 130 km (80 miles) northeast of Calhoun County.

Patera panselenus sites were exposed rock outcrops and talus within mature forest, usually on steep (15-30°) slopes. Elevations ranged from 340-490 m (1,100-1,600 feet). Live *P. panselenus* were most often encountered on nearly vertical rock surfaces or the underside of rock overhangs. While these rocks were most often sandstone, *P. panselenus* was also found on shale and limestone. Aggregations of up to a dozen scattered animals were observed on rock outcrops on two occasions.

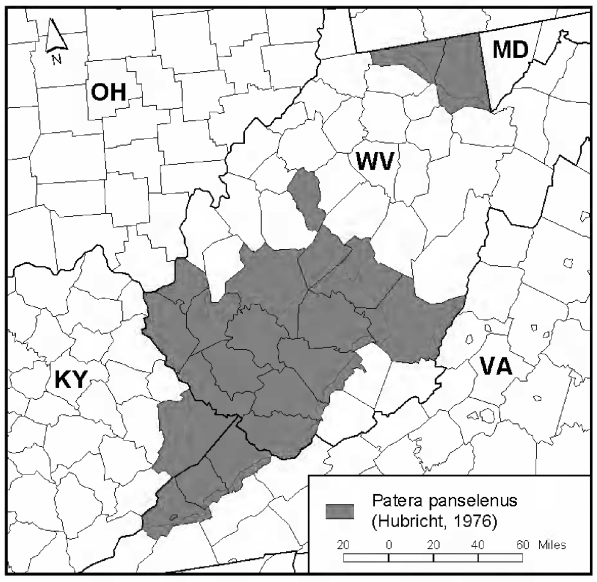

Fig. 2. County distribution of *Patera panselenus*, adapted from Hubricht (1985).

Trees at sites included *Acer saccharum*, *Betula allegheniensis, B. lenta, Fagus grandifolia, Fraxinus americana, Liriodendron tulipifera, Tilia americana, Tsuga canadensis,* and *Quercus rubra.* Understory vegetation was not thoroughly noted, but included *Athyrium pycnocarpon* (Spreng.) Tidestr. and *Camptosaurus rhizophyllus* (L.) Link. at a limestone outcrop site; and *Dryopteris spinulosa* (O.F. Muell.) Watt, *Dioscorea* sp., *Parthenocissus quinquefolia* (L.) Planch., *Toxicodendron radicans* L., *Sassafrass albidum* (Nutt.) Nees, *Sedum ternatum* Michx., *Trillium* sp., and *Urtica* sp. at other sites. No land snails other than *Triodopsis platysayoides* were found co-occurring on the steep rock surface microhabitat with live *Patera panselenus*, though many land snail species were found in other nearby microhabitats.

Patera panselenus shells were flattened and had a parietal tooth as described and illustrated (Fig. 1) in Hubricht (1976). Shell diameters of collected specimens, not including the lip (several had damaged lips), ranged from 17.4 to 18.7 mm (N = 7), and shell heights ranged from 8.0 to 9.4 mm (N = 6). Shell microsculpture revealed rounded ridges with regularly-spaced spiral striae typical of *P. perigrapta* and *P. panselenus* (Pilsbry, 1940; Hubricht, 1976).

Dissection of two *P. panselenus* revealed typical genitalia: a shorter penis (approximately 10 mm long) than that of *P. perigrapta*; a penial retractor (also 10 mm long) widened and thickened near the apex of the penis (but not hollow); a pronounced bend approximately midway in the penis; and a vas deferens swollen near its insertion into the vagina (Fig. 3). Also noted is the opening into the vagina of the spermathecal duct, very close to, but further downstream, than that of the vas deferens.

Internal sculpture of the penis was also typical, with two pilasters running the length of the penis, the left weak and the right more robust. The upper third of the right pilaster was expanded, becoming a "hood" near the apex where the pilasters join.

DISCUSSION

Understanding the geographic distribution of Appalachian Mountain endemic land snails is useful to naturalists and scientists, and may be important in conservation of the snails themselves. Many highly-localized snail species are found in this region (e.g., Hubricht, 1985) where logging, road building, mining, and development may have long-term population and habitat fragmentation impacts.

Identification of *P. panselenus* from the lower Cheat River was confirmed by characteristics of shells and, for the two animals with soft tissue, by internal penial sculpture as described and illustrated in Emberton (1991).

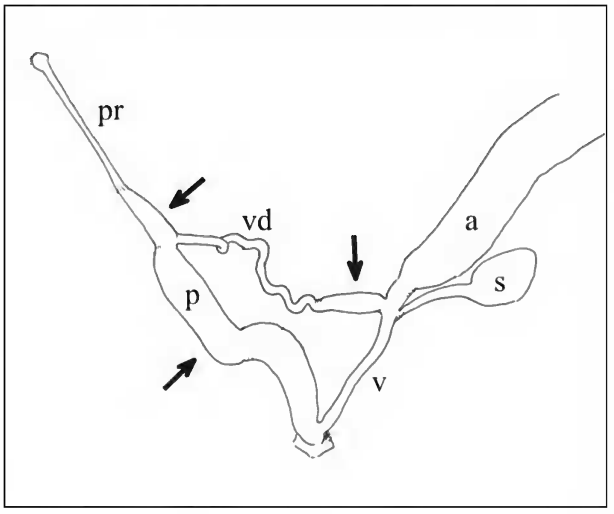

Fig. 3. Drawing of *Patera panselenus* genitalia (CMNH 64753) from the lower Cheat River, by the author. pr) penial retractor (10 mm); p) penis (10 mm); vd) vas deferens (10 mm); v) vagina (6 mm); s) spermatheca (8 mm, including duct); a) albumen gland. Note the widening of the penial retractor near the apex of the penis, the bend midway in the penis, and the expansion of the vas deferens near its vaginal insertion. The vas deferens enters the penis slightly behind the penial retractor in this view.

Patera panselenus may have escaped previous notice on the lower Cheat River due to rugged terrain and an apparently patchy distribution, as well as the misidentification of the Mont Chateau specimen as *P. appressa*. At the time it was collected and identified (before *P. panselenus* was described), the Mont Chateau shell might have been more properly assigned to *P. perigrapta*. The range limits of *P. appressa* are Gallia County, Ohio, Fayette County, West Virginia, and Queen Annes County, Maryland (Hubricht, 1985). Monongalia County is much farther north and more interior to the Appalachian Plateau.

Due to the fact that encounters with *P. panselenus* were mostly incidental to work on *T. platysayoides*, this report may not entirely describe its possible habitats or occurrences on the lower Cheat River. Also, because this animal was found at the most upstream of the habitats surveyed (Pringle Tract of Camp Dawson), there may be more locations farther upstream (south) in Preston County, and perhaps downstream (north) in Monongalia County as well.

If the distribution of *P. panselenus* on the lower Cheat River is restricted to scattered rock outcrops and talus, as it appears, it may be vulnerable to human activities that impact these localized environments. In addition to direct habitat loss, sedimentation and erosion from road building or other earth moving on steep slopes above or below outcrops can alter substrate and fill crevices. Roads can also intercept groundwater flow, reducing soil moisture in some areas while increasing peak flows downslope. Tree canopy impacts due to logging or other clearing activities may also affect microclimate temperature and humidity at outcrops. Local climate change has been associated with loss of certain snail species (Baur & Baur, 1993). The possible impacts to this species from pesticide spraying, non-native invasive organisms, acid rain, and global climate change are unknown.

ACKNOWLEDGMENTS

Dr. Timothy A. Pearce, Head, Section of Mollusks, shared his expertise and the resources of the Carnegie Museum of Natural History, and located the previously overlooked Mt. Chateau *Patera* sp. specimen. Jason Hiser did excellent work in rugged terrain, executing a significant portion of the snail collecting in 2002. Emily White created the distribution map. Ladd Williams, B CIV, biologist for Camp Dawson Army Training Site, Dr. Jim Anderson (West Virginia University), and Amy Spurgeon assisted with snail collection at Camp Dawson's Pringle Tract. Jeff Simcoe provided maps of Camp Dawson.

This work was supported in major part by the generous contributions of West Virginians to the Wildlife Diversity Program Fund, West Virginia Division of Natural Resources, through the purchase of wildlife license plates. Additional support was provided by the West Virginia Chapter of The Nature Conservancy and technical assistance was provided by Camp Dawson Army Training Site.

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